

The Studebaker Co-Operator

A monthly column of

Studebaker-related technical questions and answers. Answers are researched and prepared by the advisors listed to the right. Questions and answers are compiled and edited by Bob Palma, Technical Editor.

Please mail your question with a self-addressed, stamped envelope to the appropriate advisor. When sending an e-mail, please put "Studebaker Question" in the Subject Line. This will alert the advisor to the fact that your inquiry is not spam or a potentially hazardous e-mail, even though they would not recognize your address as sender.

When responding to material that has appeared in *The Co-Operator*, please address all additional information, corrections, etc., to the appropriate advisor with a copy to: **Technical Editor, Bob Palma, 309 S. Jefferson, Brownsburg IN 46112.**

Indianapolis, Indiana; summer 1963: At age 17, your Technical Editor, sams about 60 current pounds, poses after working on his first Studebaker: a 1955 Champion Regal Coupe. Unseen in the photo is the second outlet added to the exhaust manifold in the Arlington High School welding shop, and the resultant dual exhausts out the back as if it were a late President, or a Commander with Power Kit.



Motor Oil and ZDDP

An update on proper motor oil (or *additive* for motor oil, as the case may be) is in order due to an article recently published in the hobbyist magazine *Skinned Knuckles*. Therein, the author discounts the effect of inadequate levels of ZDDP (zinc dialkyl dithiophosphate) in today's "new vehicle" motor oil. He makes a blanket statement that the entire issue has been trumped up to sell product and scare hobbyists whose collector vehicles are powered by engines with flat-tappet camshaft valve trains. That includes all production Studebakers of which I'm aware. However, he offers no documentation to validate his opinion. This article has been widely circulated within the hobby and begs a response from people who are able to support their opinion with documentation.

Such as our own **Jim Pepper**.

Jim, you will recall, is a Harley-Davidson Motor Company Experimental Mechanic. Because he works within the engineering community, his expertise with current engineering practices augments his extensive personal experience. Jim's take on the *Skinned Knuckles* article is to the point:

Dear Bob:

Thanks for the opportunity to comment on the ZDDP remarks in Skinned Knuckles. I disagree with the author's assertions, based on my real-world experiences.

I have had in my hands two consecutive flat-tappet camshafts and corresponding lifters from Ford 351 engines that were wiped out. The first failure occurred at 20,000 miles and the second one at 20 minutes(!) of run time. Both were run with contemporary 10W-30 oil marketed for today's roller-cam engines; oil that we know does not contain the ZDDP concentration required for the higher loads and shearing forces of flat-tappet camshaft valve trains.

A third camshaft, tested at the same time, did not experience failure; it lived due to the oil selected for its flat-tappet valve train.

Most of my experience and opinions are formed within a high performance environment. Engineers can state their opinions, but the physical results are facts. Performance valve spring pressures and cam lobe ramp angles/rates put more demand on lubricants than the older, flathead, 6-cylinder engines on which the Skinned Knuckles concentrated.

A typical Studebaker V-8 has gentle ramp rates and valve springs that cannot control the valve train beyond 4500 rpm. In this environment, it might not matter. However, I have measured Avanti cams with over .025" lobe wear, and you know R-series Avanti engine flat-tappet valve trains operate under greater pressure due to stiffer valve springs.

The performance aftermarket has recommended ZDDP as an additive due to customer complaints and warranty is-

sues, not urban legends. They all had a rash of lobe failures when the oil formula changed. A performance engine with flat tappets needs around 1000-1400 ppm (parts per million) of ZDDP. I will continue to use 20W50 racing oil in my flat tappet engines. These, and other oils marketed for older engines, already have sufficient ZDDP. That's what I think. JP

I sent Ted Harbit the Skinned Knuckles article and Jim Pepper's response, to see what Ted had to say. (If anyone knows something about highly-stressed Studebaker engines, it's Ted Harbit.) Ted simply replied:

Dear Bob:

I agree with Jim. I think standard Studes might get along okay with the mild cam and ramps and the very light valve springs, but why take the chance when adding a little ZDDP will take care of it for sure?

Ted

Here are some recent, related exchanges fielded by Jim Pepper:

Dear Jim:

I've been following the ZDDP discussion in The Co-Operator and I'd like some clarification, if I may. The changing makeup of our engine oils is confusing for most of us "old car" guys. I understand that ZDDP is basically zinc, but I'm not sure why it's needed in engine oils.

Co-Operator Advisors. Please write to the appropriate Advisor with your question:

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I recently went to my local NAPA store to look for a ZDDP additive. They had one brand they sell (and not for cheap), but while reading the label I became even more confused. The directions said you should only leave it in your engine for 1,000 miles and then drain it out and replace with fresh oil.

I assumed they only intend it as a break-in additive for a new or freshly-rebuilt engine, right? But haven't recommendations been that it be used full time from oil change to oil change? If it's good to have it, why do they recommend leaving it in for only 1,000 miles?

I've got a 1963 Cruiser. Even though its original engine has been replaced with a Ford engine, it's still an older, flat-tappet cam/lifter design. I worry about getting proper lubrication to the internals, particularly the valve train. What would you think of running Rotella 15-40 and STP together? I'm currently using just Rotella, but, again, I'm concerned about the zinc thing.

Thanks for your input on this, Jim. You really do a great service to SDC and its members with your tech support in Turning Wheels, as do the other Co-Operator advisors.

Keith Janssen, via e-mail:
rooster@cactuswax.net

Dear Keith:

The additive you encountered at NAPA is probably for new engine break-in. Do not use it on a regular basis; a ZDDP additive package concentration above 1500 ppm is too high for continuous use.

There is a product called ZDDPlus available from many

suppliers, including Studebaker vendors. It supplements today's "everyday" 10W-30 (or other weight) contemporary-engine motor oil with the proper concentration of zinc and phosphorous so those oils may be used everyday in flat-tappet camshaft engines.

Rotella will work if the CI, CI+4 rating is the highest on the container and the container does not state the product is also rated CJ. "Regular" STP Oil Treatment contains ZDDP and, as we've published, they say it is of sufficient concentration to supplement contemporary oil for older engines. They will not say what the ppm (parts per million) concentration actually is, so we have to take their word for it that it is "enough."

Valvoline says their 20W50 ZR-1 Racing Oil contains the proper ZDDP concentration, but I do not know the ppm figures. Amsoil markets synthetic oil with the proper additive package for flat-tappet engines. The Amsoil product is 10W40 or 20W50 Synthetic Premium Protection Motor Oil. You have to be careful when researching and buying Amsoil products because they have many different products with similar names. However, the above product is the oil they state contains the proper additive package necessary to protect the valve trains in older, flat-tappet camshaft engines. I hope this helps.

JP

Dear Jim:

There has been a lot of communication in the Studebaker community and other old car groups about the reduction of zinc and phosphorus levels in many engine oils. As you know, this was done by the oil companies to make these oils

meet CJ4 specifications in diesel engines when the engines started using catalytic converters.

Prior to this reduction, diesel engine oils were suitable for use in our old cars with flat-tappet camshafts. Shell Rotella, Mobil Delvac, and other company's commercial engine oils worked well in older engines. I used Mobil Delvac 1300 Super 15W40 in all of my older engines, no matter what the brand.

There is some good news I want to pass along to you. If you deem it appropriate, place it in The Co-Operator: **The old Mobil Delvac 1300 Super 15W40 has been rebranded to Mobil Delvac MX 15W40.** The Delvac 1300 Super 15W40 currently marketed has reduced additive levels. It is Exxon/Mobil's flagship product in the commercial engine oil line. Therefore, they made it conform to the latest diesel engine requirements.

Here is a list of the anti-wear additive levels in three Exxon/Mobil engine oils. You can see for yourself the change in additive element levels. I have tried to determine how much Zinc, Phosphorus, Calcium and Magnesium is needed for a flat-tappet camshaft valve train and have not been able to ascertain that conclusively. We both know valve spring tension, camshaft grind, etc, all enter into this equation, so companies are going to be hard-pressed to make specific additive requirements when there are so many variables in addition to lifter/camshaft type. Do you have any of this information?

In short, if a person wants the additive levels that were available prior to the latest changes in formulation for their old cars, the Exxon/Mobil product currently so formulated

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is **Delvac MX 15W40**. This product is suitable for diesel, gasoline, natural gas and propane-fueled engines. We use one oil in everything from Cummins to Chevy 454 engines on the farms in Kansas.

Delvac 1300 Super 15W-40

Ca: 1310 ppm

Mg: 820 ppm

Ph: 1000 ppm

Zn: 1000 ppm

Clean 5000 10W-30

Ca: 1940 ppm

Mg: Not Formulated to contain

Ph: 750 ppm

Zn: 830 ppm

Delvac MX 15W-40

Ca: 2690 ppm

Mg: 520 ppm

Ph: 1310 ppm

Zn: 1450 ppm

William M. (Bill) Jones Jr.
Exxon/Mobil Industry Sales Executive,
Lubricants Division, Retired.

Dear Bill:

Thanks for the information. Here is what I have found so far. It appears that, for most flat-tappet camshaft applications, between 1,000 and 1,400 ppm ZDDP is adequate, with a figure toward the higher number preferred. I'll have to search for some MX. I've used Delvac in my Superduty Ford pickup since new, and use Delvac 1 in winter. **JP**

Finally, SDC Past President **Ed Reynolds** wrote **American Refining Group, Inc.**, regarding the issue and received the following reply. (Yes, it may be legitimately construed as advertising, so let's just consider it an infomercial, OK?)

Dear Ed:

The purpose of this writing is to thank your members for contacting us about their lubrication concerns from your Studebaker Drivers Club website. As most are aware by now, today's engine oils have had a reduction of Zinc and Phosphorus, both critical components that protect against wear.

That's where our company, American Refining Group, Inc. (formerly the Kendall Refinery) comes into the picture. We are located in Bradford, Pennsylvania. It is the oldest continuously-running lubricant refinery in the world, and

the only fully-integrated major refinery that processes 100% Pennsylvania Grade Crude Oil.

In addition to producing a wide range of lubricants, we manufacture Brad Penn (truly the last "Made in the USA" brand) Penn Grade 1 High Performance Oil and break-in oil. Our High-Performance Oil, "The Green Oil," is popular in all automotive segments, including Classic, Historic, Vintage, Oval & Drag Racing, and Restoration and Muscle Cars; especially enthusiasts whose vehicles' engines utilize flat-tappet camshaft valve trains.

With our High Performance Oil, we did not reduce the level of ZDDP, the zinc anti-wear additive. Further, we obtain a unique cut from our tower that causes our High Performance Oil to tenaciously cling to engine parts, especially to flat tappet **and** roller cams, valve springs under heavy loads, and other critical engine parts, minimizing wear in the engine. Our product "stays put" in the camshaft/valve train area, reducing dry starts and thus minimizing wear during start up.

Crane Cams, Crower Cams, Schneider Cams, ISKY cams, Howards Cams, and Bullet/Ultradyne all recommend our High Performance Oil. Additional information about our company and products may be obtained by visiting www.bradpennracing.com or www.amref.com.

With our Penn Grade 1 distribution network, we would also welcome the opportunity to do presentations to your chapters if they would so like. If you have any questions feel free to e-mail me. Regards,

Nicholas J. Dixon, Regional Sales Manager,
American Refining Group, Inc.

In conclusion, the effects of proper ZDDP concentration are long-term. No one is going to wipe out a cam changing to modern, low-ZDDP oil and driving 84 miles RT to an SDC Chapter meeting the next day - but why roll the dice for the long haul? We all care for our vehicles, so why not invest in the lowest-price engine insurance available: Use oil with enough ZDDP in it, or buy the ZDDP additive from one of our vendors. That is low-dollar peace of mind that cannot harm your Studebaker's engine, and will dramatically reduce the potential for valve train failure in years and miles to come.

BP

LOVE THAT LARK